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Brief Report

Livedoid vasculopathy remains an enigma

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ABSTRACT

Background: Livedoid vasculopathy is a rare thrombotic vasculopathy typically affecting the lower limbs, particularly the legs and feet. There is increased thrombotic activity, decreased fibrinolysis along with thickened dermal vessel walls. Procoagulant pathogenesis is suspected with a link to factor V Leiden mutation, protein C deficiency, hyperhomocysteinemia, and elevated levels of plasminogen activator inhibitor (PAI)–1.

Objective: The objective was to provide a descriptive analysis of livedoid vasculopathy with a short review of the literature. **Patients and Methods:** This was a case-series, descriptive study conducted on patients diagnosed between 2016 and 2024. Full demographic and clinical assessment was accomplished. Biopsies were taken for detailed microscopic examination. **Results:** Nineteen patients (12 females, 7 males) were evaluated, with a ratio of 1.7:1. Their ages ranged from 30 to 45 years. The disease followed a chronic course of 2–4 years. All lesions began as erythematous, dusky, pigmented lesions that evolved to form punched-out ulcers of different sizes, becoming larger over time. The main symptoms were burning pain and discomfort, with no well-defined seasonal variation. The pathology showed increased dermal vasculature, and thickened blood vessel walls with thrombus formation. The therapeutic regimen was bed rest, a topical antiseptic such as povidone, low-dose oral corticosteroids, an antihistamine, and dapsone. All these measures induced full remission, yet flare-ups might follow after the cessation of therapy. **Conclusion:** This study offered insights into the potential causes and treatment outcomes of livedoid vasculopathy, albeit not well understood. The present work identified the main pathogenic process to be the occlusion of dermal vasculature with great thickening of their walls. However, larger population studies are needed to confirm these findings.

Key words: Livedoid Vasculopathy, Thrombosis, Blood Coagulation

INTRODUCTION

Livedoid vasculopathy (LV) is a rare, chronic, and recurrent thromboembolic disorder characterized by the occlusion of the dermal blood vessels. It primarily affects young to middle-aged women and is most commonly observed on the lower extremities [1]. The condition was first described by Milian in 1929 as *atrophie blanche*. Later, in 1955, Feldakar emphasized the involvement of coagulation abnormalities in its pathogenesis. The term *livedoid vasculopathy* was introduced by Bard and Winkelmann in 1967 [2]. This condition was referred to by various names over time, reflecting its complex nature and clinical presentation. Its synonyms include Milian's white atrophy, livedo vasculitis, segmental hyalinizing vasculitis, livedoid vasculitis, livedo reticularis with summer ulcers, and the acronym PURPLE (purpuric painful ulcers with reticular pattern of the lower extremities [3]. Clinically, LV presents as punctate or lenticular, purple-colored macules and/or papules on the lower legs and ankles. These lesions often progress to painful ulcers, which heal slowly over weeks to months, leaving behind characteristic pearly white atrophic scars (*atrophie blanche*), punctate telangiectasias, brownish pigmentation, and a racemose pattern of livedo [4-6]. Although the exact pathogenesis of LV remains unclear, it is believed to involve disturbances in local or systemic coagulation, leading to the formation of fibrin thrombi within the superficial dermal vessels. Several

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prothrombotic factors have been implicated, including antiphospholipid antibodies, deficiencies of protein C and S, factor V Leiden mutation, prothrombin gene mutations, hyperhomocysteinemia, antithrombin III deficiency, and sticky platelet syndrome.

PATIENTS AND METHODS

This is a case-series, descriptive study in which data of nineteen patients seen during the period from 2016 to 2024 were collected and analyzed. Full demographic and clinical assessment was accomplished. Full investigations were performed and yielded normal results. Biopsies for histopathological examination were taken.

RESULTS

Nineteen patients with livedoid vasculopathy were evaluated. Their ages ranged from 30 to 45 years with 12 (63%) females and 7 (37%) males, giving a ratio 1.7:1. The course of the disease was chronic, with its duration ranging from 2 to 4 years. All lesions began as erythematous, dusky, pigmented lesions that ruptured to form punched-out rigged ulcers as if perforations of different sizes. These ulcerations became larger over time (Figs. 1a – 1d). Edema was noticed in 11 (57,89%) patients, which involved the feet and ankles, non-pitting type, and was bilateral in all 11 (57,89%) cases. Eleven females and six males had scarring (89.4%). Two males also had reticular pigmentation. The main symptoms were burning pain and discomfort. There was no well-defined seasonal variation as some flared in winter while others in summer. Dermoscopic examination showed central crusted ulcers or ivory-white areas associated with peripheral pigmentation forming a reticular pattern. Additionally, other vascular structures, such as glomerular and linear vessels, were noticed (Figs. 2a and 2b). The pathology mainly showed increased dermal vasculature with thickened blood vessel walls blocked by thrombi and thickening of the epidermis (Figs. 3a and 3b). The therapeutic regimen was bed rest, a topical antiseptic such as povidone, low-dose oral corticosteroids, and an oral antihistamine. Dapsone was used as an anti-inflammatory agent. All these measures induced full remission, yet flare-ups might follow after stopping therapy.

DISCUSSION

Livedoid vasculopathy (LV) is a hyalinizing vascular disorder characterized by thrombotic occlusion and ulceration, primarily affecting the lower extremities [2]. Despite advances in understanding, its pathogenesis remains elusive and continues to challenge both researchers and clinicians. The predominant mechanism is believed to be hypercoagulability, with inflammation playing a secondary role. More recently, autoimmune factors have also been implicated.

Figure 1: (a-d) Clinical presentation of livedoid vasculopathy; small crusted ulcers that eventually heal to form white, atrophic scars. Fully developed lesions of livedoid vasculopathy are characterized by atrophic plaques with hyperpigmented borders and telangiectatic vessels. The lower legs, especially the dorsum of the feet and ankles, are most often affected.

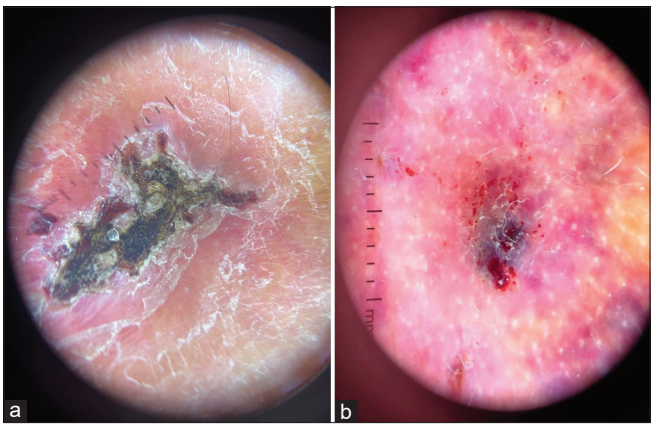

Figure 2: (a and b) Dermoscopic findings show ivory-white atrophic scar-like areas. The periphery of the lesions is hyperpigmented in a reticular pattern. Increased vascular structures in the periphery of the lesions, including telangiectatic linear vessels and glomerular vessels.

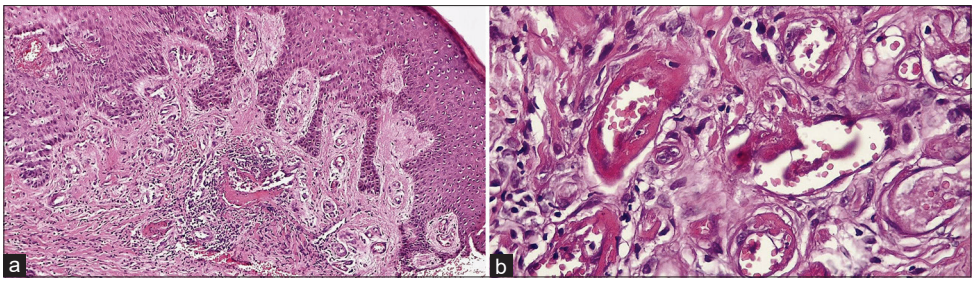

Figure 3: (a) H&E-stained sections showing irregular acanthosis, mild spongiosis, dermal edema, vascular dilatation with perivascular mixed inflammatory infiltrate. Dermal fibrosis is evident with extravasation of RBCs (40x, 100x).(b) Higher power showing small blood vessels with thick, hyalinized walls, with some endothelial swelling and damage (400x).

Table 1: A comparison between livedoid vasculopathy and Schamberg disease.

Feature	Livedoid Vasculopathy	Schamberg Disease
Known as	Milian's white atrophy, livedo vasculitis, segmental hyalinizing vasculitis, livedoid vasculitis, livedo reticularis with summer ulcers, and the acronym PURPLE (Purpuric Painful Ulcers with Reticular Pattern of the Lower Extremities) [3]	Purpura pigmentosa progressive [21]
Age group	Young to middle-age [1]	Middle age [21]
Sex	Female > male [1]	Male > female [21]
Site of predilection	Legs symmetrically [2]	Legs symmetrically [21]
Pathogenesis	Idiopathic, hypercoagulability, with inflammation leads to thrombotic occlusion of the blood vessels [22]	Increased intravascular pressure leading to constant aneurysmal dilation of the capillaries, making their walls fragile and prone to rupture in the papillary dermis [21]
Underlying mechanism	Antiphospholipid antibodies, deficiencies of protein C and S, factor V Leiden mutation, prothrombin gene mutations, hyperhomocysteinemia, antithrombin III deficiency, and sticky platelet syndrome [22]	Long periods of standing, drugs such as aspirin and acetaminophen, venous insufficiency, diabetes [21]
Type of vasculitis	No true vasculitis [3]	Lymphocytic vasculitis, stasis vasculitis [21]
Histopathology	Pathology mainly showing increased dermal vasculature with thickened blood vessel walls blocked by thrombi, thickening of the epidermis.	Normal stratum corneum, acanthosis, epidermal atrophy, spongiosis and basal layer vacuolization, perivascular lymphocytic infiltrate, RBC extravasation, hemosiderin-laden macrophages [21]
Clinical appearance	Erythematous dusky pigmented lesions rupturing to form punched-out ulcers.	Red-brown macules and petechiae, patches, plaques [21]
Symptoms	Pain, burning, discomfort.	Asymptomatic [21]
Course	Chronic, relapsing remitting, scarring.	Chronic, slowly progressive, no scarring [21]

To our knowledge, this is the first case series in the Iraqi population, probably due to paucity of cases in the prior decades. Therefore, this article aims to raise awareness about this elusive disease. In this case series, the demographic pattern is consistent with global trends, where LV shows a slight female predominance and typically affects young to middle-aged adults [7]. Chronicity and recurrent painful ulceration were the key features, significantly impairing the patient's quality of life, a finding echoed in multiple studies [8].

LV may present as either a primary or secondary condition. In primary LV, there is no identifiable underlying disorder. Secondary LV, however, is frequently associated with prothrombotic conditions such as factor V Leiden mutation, deficiencies of protein C or S, hyperhomocysteinemia, and prothrombin gene mutation. It is also linked to autoimmune and connective tissue diseases, including systemic lupus erythematosus (SLE), cryoglobulinemia, and antiphospholipid syndrome (APS) [1]. Initially classified as a form of vasculitis, LV is now understood to result from the occlusion of cutaneous capillary microcirculation, leading to thrombosis, ischemia, and tissue infarction. This mechanism explains the severe pain, paresthesia, and hyperesthesia commonly reported by patients [9]. The thrombotic process may arise from impaired plasminogen activation by endothelial cells, platelet dysfunction, or increased fibrin formation. Fibrin deposition around capillaries and intravascular thrombus formation create a diffusion barrier that restricts oxygen delivery to tissues, resulting in ischemic damage. Poor tissue perfusion contributes to delayed wound healing, while sluggish circulation impairs leukocyte function, increasing the risk of secondary infection [2].

The interplay between coagulation and inflammation is illustrated by the activation of protease-activated

receptor-1 (PAR-1) on endothelial cells, which stimulates the release of pro-inflammatory cytokines such as interleukin-6, interleukin-2, and monocyte chemoattractant protein-1, along with the upregulation of adhesion molecules such as intercellular adhesion molecule-1 (ICAM-1) and P-selectin. These mediators facilitate leukocyte diapedesis and amplify the inflammatory response [10]. Emerging evidence supports a contributory role of inflammation in the pathogenesis of livedoid vasculopathy. Inflammatory markers, including interleukin-2 and its soluble receptor, have been identified during disease progression. Their release from endothelial cells promotes leukocyte recruitment and sustains the inflammatory milieu [2]. Clinically, LV is defined by a classic triad: livedo racemosa, painful skin ulcerations, and atrophie blanche. The disease typically presents bilaterally [11]. Livedo racemosa is characterized by a persistent, erythematous-to-violaceous discoloration of the skin, forming a broken, branched, and irregular net-like pattern [12]. Additional clinical findings may include purpuric macules, papules, and retiform purpura. As the disease progresses, patients develop acute, painful, small ulcers with crusted bases representing the active phase of the condition. Ulcerations are most commonly located below the knees, particularly around the ankles, more often on the medial than the lateral aspects, followed by the dorsal foot and the anterior distal leg. These ulcers typically heal over a period of 3–4 months, leaving behind the hallmark feature of atrophie blanche stellate, porcelain-white atrophic scars surrounded by areas of hyperpigmentation and telangiectasia [11].

Histopathologically, livedoid vasculopathy is defined by the presence of hyaline thrombi within small, and occasionally medium-sized, dermal vessels. Perivascular hemorrhage may also be observed. Importantly, leukocytoclastic vasculitis is absent, and histological findings are typically described as "intravascular thrombosis without inflammation." Although focal lymphocytic infiltrates may be present both within and around vessels, these are generally considered secondary to thrombosis and not a primary pathogenic feature of the disease [3]. In this study, a thickened epidermis was noted, in contrast to the usual thinning seen in later stages, suggesting that the biopsy was obtained early in the disease course.

Direct immunofluorescence (DIF) studies in patients with LV commonly reveal a deposition of immunoglobulins, complement components, and fibrin. The positivity rate for immunoreactants in DIF ranges from 42.9% to 100%, with C3 and IgM being the most frequently detected, followed by IgA and IgG. The most typical DIF pattern shows immunoreactant deposition within blood vessels and at the dermoepidermal junction [13].

The histological appearance of LV evolves across the following stages of the disease.

- Early stage: Sparse perivascular lymphocytic infiltrate, fibrin deposition within the walls of venules, fibrin thrombi occluding the lumens of the upper dermal venules.
- Fully developed disease: Moderately dense lymphocytic infiltrate in superficial and deep perivascular areas, extensive fibrin deposition in venular walls, thrombi occluding the upper dermal venules, numerous extravasated red blood cells, papillary dermal edema, occasionally, epidermal spongiosis and necrosis.
- Late stage: Sparse lymphocytic infiltrate in the upper dermis, dermal sclerosis, numerous telangiectasias in the upper dermis, and a thinned, atrophic epidermis [14].

LV must be distinguished from other conditions that produce similar cutaneous lesions on the legs: cutaneous polyarteritis nodosa (PAN), Schamberg disease (as shown in table 1), true small- and middle-vessel cutaneous vasculitis (connective tissue diseases and antineutrophil cytoplasmic antibody-related vasculitis), pyoderma gangrenosum, cryoglobulinemic vasculitis, and warfarin-induced cutaneous necrosis. The main differential diagnosis is cutaneous polyarteritis nodosa. This entity may produce clinical cutaneous lesions very similar to that determined by LV, displaying purple reticulate ulcers and scars similar to AB. In addition, subcutaneous nodules are often noted [15].

Due to the unclear and multifactorial pathogenesis of livedoid vasculopathy, there is currently no universally effective treatment. Management strategies are largely derived from isolated case reports and small case series, with most therapies aimed at alleviating pain and improving cutaneous symptoms. Supportive care forms the cornerstone of treatment. Lifestyle modifications, such as smoking cessation, are essential, as smoking-induced vasoconstriction and tissue hypoxia can exacerbate skin damage [16]. Antiplatelet agents are commonly used and include medications such as clopidogrel, ticlopidine, abciximab, buflomedil hydrochloride, and beraprost sodium. However, aspirin, pentoxifylline, and dipyridamole remain the

most frequently administered options. In addition, anticoagulant therapy is often employed, particularly in cases with documented or suspected thrombophilia. Agents used include warfarin, unfractionated heparin, low-molecular-weight heparin, vitamin K antagonists, sulodexide, and more recently, rivaroxaban, which has shown promise in clinical practice [17].

Anabolic steroids were the second most commonly reported monotherapy used in the treatment of LV. Therapies such as intravenous immunoglobulin, psoralen and UVA (PUVA), and hyperbaric oxygen therapy (HBOT), have demonstrated favorable clinical outcomes and may be more appropriate for refractory LV cases, due to high cost and challenges with patient adherence [18]. Additional treatment options, including fibrinolytics, vasodilators, anti-inflammatory, and immunosuppressive agents, may be considered when first-line treatment fails and are typically reserved as third-line therapy. Anti-inflammatory medications such as colchicine, dapsone, and hydroxychloroquine have also shown beneficial effect [11].

The use of baricitinib, which is a new JAK 1 and JAK 2 inhibitor, has also been reported to treat a number of patients with LV who were resistant to conventional therapy and showed good improvement with no adverse events [19].

In the current study, the therapeutic regimen was bed rest, an topical antiseptic such as povidone, low-dose oral corticosteroids, and an oral antihistamine. Dapsone was used as an anti-inflammatory agent. All these measures induced full remission, yet flare-ups might follow after stopping therapy.

Systemic steroids promote fibrinolysis, suppress coagulation, and stimulate the hepatic synthesis of protease inhibitors (such as proteins C and S). They have been reported as an effective treatment option, particularly in patients with coexisting connective tissue disease [17,18].

Although livedoid vasculopathy is not considered a true vasculitis, the use of dapsone in its treatment may still be justified based on the inflammatory mechanisms involved. LV is primarily a thrombotic microvascular disorder rather than an immune complex–mediated vasculitis. However, histopathological studies often reveal evidence of secondary inflammation, including perivascular infiltrates rich in neutrophils, particularly during active or ulcerative phases of the disease.

Dapsone's mechanism of action is especially relevant in this setting. It reduces oxidative stress and tissue injury by inhibiting neutrophil myeloperoxidase activity and the respiratory burst, even in conditions where inflammation is not the primary driver. Moreover, dapsone impairs neutrophil chemotaxis by inhibiting IL-8 release and function, and it disrupts neutrophil adhesion and recruitment by stabilizing lysosomes and inhibiting integrin-dependent interactions [1].

Therefore, while LV lacks the classic features of vasculitis such as fibrinoid necrosis and immune complex deposition, the secondary neutrophil-mediated inflammatory response appears to play a role in lesion progression and ulcer formation. The clinical improvement observed with dapsone in our study supports the hypothesis that modulating neutrophilic inflammation, even in a non-vasculitic setting, may provide therapeutic benefit. Dapson drug-treated groups significantly enhanced wound healing as assessed by the wound closure rate, time taken for complete epithelization and reduction in scar size, increased the granuloma dry weight, granuloma breaking strength, and collagen content as indicated by hydroxyproline estimation [20,22].

CONCLUSION

This study offered a deeper insight into the potential causes and treatment outcomes of livedoid vasculopathy despite being not well understood. The present work identified the main pathogenic process as the occlusion of dermal vasculature with great thickening of their walls. However, a larger number of patients is essentially needed to have more confirmatory clinical outcomes.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

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Ethical Approval and Patient Consent

This study was conducted in accordance with the ethical principles of the Declaration of Helsinki. All patients provided informed written and verbal consent to participate. The clinical images included in this publication show only the lower extremities and do

not reveal any identifying features. Patient privacy and anonymity have been strictly protected.

REFERENCES

1. Piette WW. Cutaneous manifestation of microvascular occlusion syndromes. In: Bolognia JL, Schaffer JV, Cerroni L, editors. Dermatology. 4th ed. Philadelphia: Elsevier; 2018. p. 390-408e1.
2. Burg MR, Mitschang C, Goerge T, Schneider SW. Livedoid vasculopathy: A diagnostic and therapeutic challenge. Front Med. 2022;9:1012178.
3. Elston DM. Cutaneous vascular disease. In: James WD, Berger TG, Elston DM, editors. Andrews' diseases of the skin: clinical dermatology. 11th ed. Philadelphia: Saunders Elsevier; 2011. p. 801–845.
4. Hairston BR, Davis MDP, Pittelkow MR, Ahmed I. Livedoid vasculopathy: Further evidence for procoagulant pathogenesis. Arch Dermatol. 2006;142:1413-8.
5. Criado PR, Rivitti EA, Sotto MN, Valente NYS, Aoki V, de Carvalho JF, et al. Vasculopatia livedoide: uma doenc¸a cutânea intrigante. An Bras Dermatol. 2011;86:961-77.
6. Zanini M, Bertino D, Wulkan C, Ito L. Vasculite ou vasculopatia livedoide? An Bras Dermatol. 2003;78:755-7.
7. Shavit E, Dreiher J, Freud T, Halevy S, Vardy DA, Bitterman H, et al. Livedoid vasculopathy: Demographics, clinical characteristics, and comorbidities in a large series of patients. J Am Acad Dermatol. 2015;72:736-44.
8. Criado PR, Rivitti EA, Sotto MN, Aoki V, Valente NYS, Fukumori LMI, et al. Livedoid vasculopathy as a cause of chronic painful ulcers. Int J Dermatol. 2005;44:857-61.
9. Amato L, Chiarini C, Berti S, Massi D, Fabbri P. Idiopathic atrophie blanche. Skinmed. 2006;5:151-4.
10. Papi M, Didona B, De Pità O, Frezzolini A, Di Giulio S, De Matteis W, et al. Livedo vasculopathy vs small vessel cutaneous vasculitis: Cytokine and platelet P-selectin studies. Arch Dermatol. 1998;134:447-52.
11. Seguí M, Llamas-Velasco M. A comprehensive review on pathogenesis, associations, clinical findings, and treatment of livedoid vasculopathy. Front Med. 2022;9:993515.
12. Weishaupt C, Strölin A, Kahle B, Kreuter A, Schneider SW, Gerss J, et al. Characteristics, risk factors and treatment reality in livedoid vasculopathy: A multicentre analysis. J Eur Acad Dermatol Venereol. 2019;33:1784-91.
13. Nuttawong S, Chularojanamontri L, Trakanwittayarak S, Pinkaew S, Chanchaemsri N, Rujitharanawong C. Direct immunofluorescence findings in livedoid vasculopathy: A 10-year study and literature review. Clin Exp Dermatol. 2021;46:525-31.
14. Vasudevan B, Neema S, Verma R. Livedoid vasculopathy: A review of pathogenesis and principles of management. Indian J Dermatol Venereol Leprol. 2016;82:478.
15. Alavi A, Hafner J, Dutz JP, Mayer D, Sibbald RG, Criado PR, et al. Livedoid vasculopathy: An in-depth analysis using a modified Delphi approach. J Am Acad Dermatol. 2013;69:1033-42.
16. Gonzalez-Santiago TM, Davis MDP. Update of management of connective tissue diseases: Livedoid vasculopathy. Dermatol Ther. 2012;25:183-94.
17. Bilgic A, Ozcobanoglu S, Bozca BC, Alpsoy E. Livedoid vasculopathy: A multidisciplinary clinical approach to diagnosis and management. Int J Womens Dermatol. 2021;7(5Part A):588-99.
18. Micieli R, Alavi A. Treatment for livedoid vasculopathy: A systematic review. JAMA Dermatol. 2018;154:193-202.
19. Song X, Tu P. Treatment of livedoid vasculopathy with baricitinib. JAMA Dermatol. 2022;158:587-9.
20. Chandrashekar K, Hogade AP, Hiremath, PR M. Effect of dapson on wound healing. Pharmacologyonline. 2010;2:219-25.
21. Sharquie K, Hussein Z. Schamberg's disease: The clinical and histopathological findings in favor of stasis vasculitis. J Pak Assoc Dermatol. 2022;32:478-84.
22. Sharquie KE, Ahmed AA, Mancy A. Livedoid vasculopathy. In: Challenging Clinical Practice in Dermatology and Cosmetology as a New Platform for Teaching. 1st ed (part one). Italy: World Health Academy Publishing House. 2025. P. 170-3.

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